Mr. Norman, Mr. Peach, Dr. McIntosh, Prof. Ray Lankester, and others who have given him valuable aid in his work, gives an account of the structure of the Polyzoa generally, with some details concerning their development, life-history, and distribution. Several pages are devoted to the question of the name of the class concerning which it seems almost hopeless that any unanimity amongst naturalists will be attained. The author adopts J. V. Thompson's term Polyzoa on the ground of priority, and we hope it may prevail in this country, although it is scarcely probable that Continental zoologists will, as the author trusts, "reconsider the grounds on which they have hitherto given their adhesion to Ehrenberg," and give up the term Bryozoa (*Moosthierchen*).

Several pages are devoted to the question of the nature of the "brown bodies," which the author, following Prof. F. A. Smith and from his own extended observations, formerly considered to be essentially concerned in the production of new polypides by germination. He now admits that the evidence at present tallies better with the residuary theory of Nitsche and Joliet, who, as is well known, regard the bodies as merely remains of decayed polypides, but thinks that further investigation on the matter is yet required. An interesting series of woodcuts are given illustrating, as shown in a series of different species, the development of the avicularium from the first rudimentary stages, hardly distinguishable from the ordinary zoœcium, up to its most highly specialised bird's head-like form. Most readers are familiar with Mr. Darwin's account of his experiments on the avicularia of Polyozoa made during the voyage of the *Beagle* and published in his Journal. The author after citing these, and those of Mr. Busk and others, expresses himself as inclined to regard the avicularia as "charged with an offensive rather than alimentary function," believing that their vigorous movements and the snapping of their formidable jaws may drive away loafing annelids and other enemies.

Some short account of the embryonic development of the Polyozoa is given, and is illustrated by a coloured plate of larvæ taken from the splendid monograph on the subject by Dr. J. Barrois of Lille. In the matter of classification the author follows Ray Lankester as far as the main sub-classes are concerned, dividing the class according to the characters of the lophophore into the Holobranchiata, or those which have the tentacles in a continuous series, and the Pterobranchiata, in which the lophopore is broken into two distinct arms like those of Brachiopods. The Pterobranchiata include only a single genus, the remarkable Rhabdopleura of Allman. The Holobranchiata are divided, after Nitsche, into the Ectoprocta, in which the anal orifice lies without the lophophore, and the Entoprocta, in which the orifice lies within it. The latter group includes the genera Pedicellina and Loxosoma only, whilst the main mass of the existing Polyzoa come under the Ectoprocta, the marine forms of which form a single order, Gymnolæmata of Allman, which order is divided by the author according to Mr. Busk's well-known system into the sub-orders Cheilostomata, Cyclostomata, and Ctenostomata. The generic terms adopted in the work are however in many instances different from those employed by Mr. Busk and other former authors, and many familiar species have changed their names, so that the student is somewhat confused. Thus the species hitherto ranged under the genus Leptalia are separated into sections and placed under the author's three genera, Mastigophora, Schizoporella, Schizotheca, and other genera.

As before stated, the number of British species of marine Polyzoa described in the work is 235. Of these 69 have as yet not been found elsewhere, but as the author adds, no inference as to their range can be drawn from this negative fact. For 28 species Shetland is the only British locality, 8 of these not being found elsewhere, whilst the remainder are Arctic forms, with the exception of two, one of which, *Cellaria johnsoni*, ranges as far south as Madeira, and is abundant in the Mediterranean. Some of the British species have an extraordinarily wide range. Thus *Cellaria fistulosa* occurs in the Mediterranean at Madeira, in South Africa, in Scandinavia and North America, in the Indian Ocean, and in Australia and New Zealand. And there are several similar instances of almost world-wide distribution, the species not being deep-sea forms, but such as flourish between tide-marks and in shallow water, though also found at greater depths. The author suggests as a possible explanation of the wideness of range of such species, in addition to migration along coast lines and in profound depths, the agency of currents, floating timber, and ships. There is a very close resemblance between the Polyzoan fauna of the south-west coasts of France and our own, whilst a small group of Polyzoa is common to our shores and those of South Africa; but these are also Mediterranean. The author expects that a flood of light will be thrown on the subject of the distribution of the Polyzoa by the results of the *Challenger* Expedition, when published. It is obvious that in treating of any branch of the marine fauna of a restricted area, such as the British Isles, it will be necessary to make some restriction as to depth in considering questions of distribution. Once the abyssal fauna is reached by the dredge the animals obtained have no longer any special connection with the shores off which they are obtained, but belong to the ocean bottom and are mostly cosmopolitan, or rather Oceanopolitan.

The cordial thanks of zoologists are certainly due to Mr. Hincks for having produced this most useful work. It will be valuable not only to the professed naturalist, but also an entertaining addition to the sea-side libraries of those who work occasionally with the microscope for recreation.

OUR BOOK SHELF

A Popular History of Science. By Rob. Routledge, B.Sc. (London: George Routledge and Sons, 1881.)

IN looking through many of the works on popular science one is inclined to exclaim, "Oh, monstrous! but one halfpennyworth of bread to this intolerable deal of sack." Mr. Routledge's recent volume is fortunately an exception to this rule, for in it we find a clear and concise statement of the development of the main branches of physical science given in a readable form with such an amount of biographical notices as to impart a human interest to the tale. Extracts, too, from the writings of the great workers in science have been judiciously interspersed throughout the text, thus bringing the student into direct communication with the master mind. Numerous illus-

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trations accompany the description; some of these are original, and others taken from the French, and none the worse for that. Most of them are well executed, but intimate friends might possibly find some fault with the likenesses of living men of science. Of course it is an easy as it would be a thankless task to point out sins of omission, and perhaps also of commission, in a book like the one under notice. Such works must not be looked upon with the eye of microscopic criticism. If the general direction which the author takes is the right one, if he does not make his task easy by glossing over all the points of difficulty, but puts his case clearly and fairly forward, he may well be excused if he omits matters which one or other of his readers may deem necessary. These conditions Mr. Routledge, as it seems to us, has satisfactorily fulfilled. We can therefore cordially recommend this "Popular History of Science," believing that it will exert a healthy influence on all who read it, and may be a powerful means of spreading the love of science amongst the rising generation. H. E. R.

Class-Book of Elementary Mechanics, adapted to the Requirements of the New Code. Part I. *Matter.* By Wm. Hewitt, B.Sc., Science Demonstrator for the Liverpool School Board. (London: George Philip and Son, 1880.)

MR. HEWITT has probably had a better chance than any other teacher of knowing by experience the working of the meagre science-subjects of the new educational code. The defects of that code, and particularly of its directions as to the subject of mechanics, are very great; nevertheless the little book which Mr. Hewitt has produced shows how, in spite of the disadvantageous system under which he works, a really good teacher will succeed in working up the subject for his pupils. We have seldom met with a *really* elementary book which at once combined to so great a degree simplicity of language, accuracy of description, and sound science. Mr. Hewitt states as his experience that the main difficulty has hitherto been to get the children to express in anything like precise language the ideas suggested to their minds by the simple experiments shown them. He therefore intended this little work to serve as a lesson-book to be read by the pupils in the intervals between the experimental lessons. This first part covers the ground prescribed by Schedule IV. for the first stage. A second part, dealing with "Force," is in preparation, and will embrace the subjects of the second and third stages. We hope Mr. Hewitt's second part will prove as satisfactory as is his first instalment. His aims are limited, indeed, by the requirements of the Code, but within those narrow limits his success is great.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Sir Wyville Thomson and Natural Selection

I HAVE at least great reason to be thankful that my stupidity has not prevented me from thoroughly enjoying the teachings of Mr. Darwin and Mr. Wallace, which I confess to having regarded as chiefly masterly and charming "studies in variation," for the last twenty years.

The title of the epoch-marking book which came of age last month was, however, "The Origin of Species by Means of Natural Selection." Mr. Darwin, as I am well aware, has put forward this mode of the origin of species as a part only of a hypothesis which is universally looked upon as a supreme effort of genius.

It seemed to me, rightly or wrongly, that the fauna of the enormous area forming the abyssal region existed under conditions which held out the hope that it might throw some light upon a question which appears to underlie the whole matter, and which is still unanswered. Are physiological species the result of the gradual modification of pre-existing species by natural selection, *or by any similar process;* or are they due to the action of a law as yet utterly unknown, by which the long chain of organisms rolls off in a series of definite links?

I fear I scarcely follow Mr. Darwin's illustration. If one were to pay his first visit to a breeder's, and be shown a flock of Leicesters, never having seen or heard of a sheep before, he would see nothing but a flock of sheep, and would certainly, without justly incurring the contumely of the breeder, be entitled to set them down merely as a group of animals of the same *species,* that is to say, animals fertile with one another and producing fertile progeny. He would judge so from their common resemblance, and without previous observation or information I do not see how he could know more about them. But give him an opportunity of comparing the results of breeding throughout a long period of time, or of observing the process of breeding over half the world, which comes to much the same thing; the breeder might then have cause to rail if he had not picked up the stages of the process.

The close examination of the newer tertiaries and the careful analysis of the fauna of the deep sea seem to me fairly to represent these two methods; both of these promise to yield a mass of information in regard to the course of evolution, but as to the *mode* of the origin of species both seem as yet equally silent.

I will ask you in a week or two for space for a short paper on "The Abyssal Fauna in Relation to the Origin of Species."

C. WYVILLE THOMSON

Rapidity of Growth in Corals

THROUGH the kindness of M. Parrayon, captain of the French man-of-war *Dayot,* I have received a large coral of the fungia tribe, which was yesterday found attached to the bottom of his ship as the copper was being cleaned by native divers. The following is the history of the occurrence. The *Dayot* entered the tropical waters of the South Pacific about seven months ago, coming directly from the coast of Chile. She visited some of the islands, but made no long stay in harbour until she reached Mauga Reva (Gambia Islands), where she remained for two months in the still waters of a coral basin. On entering the basin she touched the reef slightly, and without sustaining any damage. From Mauga Reva she sailed to Tahiti, where she now lies.

Several specimens of living coral were found attached to the copper sheathing, that which I have received being the largest. It is discoidal in shape, with its upper and under surfaces respectively convex and concave, and near the centre of the under surface there is a scar, where the pedicle by which it was attached to the copper sheathing, was broken through. The disk measures 9 inches in diameter, and the weight of the specimen (now half dry) is 2 lb. 14 oz. On examining the under surface another disk 3¾ inches in diameter is seen partly imbedded in the more recent coral growth. Of this old disk about one-sixth part is dead and uncovered by new coral, and is stained of a deep blue colour from contact with the copper, while the outline of the rest of this old disk is plainly discernible, although partially covered in by plates of new coral.

My impression is that on touching the reef at Mauga Reva nine weeks ago a young fungia was jammed against the copper, became attached, and subsequently grew to its present dimensions.

The case affords an interesting illustration of the rapidity of the growth of coral in these waters. R. W. COPPINGER

Tahiti, August 13

Geological Climates

SINCE contributing the chapter in the history of the Coniferæ upon which Prof. Haughton remarks, I have seen *Araucaria Cunninghami* growing in gardens round Funchal, and my belief in the specific identity of the Bournemouth Eocene plant is further strengthened; yet still, as only foliage is known in the fossil, I should hardly be prepared to contest upon that alone a question of climate, however minute the resemblance. But even with the most undisputed identity there are so many possibilities

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